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WITH WHICH IS INCORPORATED
The Engineers' Architects' and Builders' News

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VOLUME XIX. SAN FRANCISCO, CAL., JULY 6, 1907 No. 1

## SIERRA AND MENTONE POWER HOUSES OF THE PACIFIC LIGHT AND POWER COMPANY.

The Sierra power house of the Pacific Light and Power Company, known as the Sierra power plant, is two miles up Lytle Creek and six and one-half miles east of Upland, California. The entire flow of this river is diverted by means of a wooden dam built across the river which is twenty-five feet wide at the point of diversion. This dam is supplied with flash boards for regulating the flow of water into the settling basin leading to the pipe line. The basin is in the form of a short flume with a gate at the down-stream end for discharging the sand and silt into the channel. From this flume the water is conveyed in a riveted steel pipe line directly to the power house, tapering from thirty inches at the intake, through twenty-six and twenty-two inches to twenty-two inches. At this diameter the pipe delivers the water to two 54-inch, 400-horsepower, single, Pelton water-wheel units, governed by one Type F Lombard governor, operating under a 646-ft. head, giving a static pressure of 235 pounds. As is shown by the accompanying cut, the water-wheels are outside of the building on concrete foundations at the head of the waste-way, which is also made of cement concrete, delivering the water to the river bed below.

LYTLE CREEK CANON. SIERRA POWER HOUSE IN DISTANCE.

Directly connected to these two water-wheel units are two 300-kilowatt, Westinghouse, 50-cycle, 500-volt, 2-phase

generators, 430 revolutions per minute. The exciters, two in number, belt-driven from the fly wheels of the generators, are old letter-type, Westinghouse, bipolar, 7½-kilowatt, direct-current, 125-volt generators.

The transformers in the main operating room are in two banks; one bank containing two 200-kilowatt, Westing-

SIERRA POWER HOUSE

house, oil-insulated, water-cooled, step-up transformers, 50 cycles, 500 volt, two-phase, to 17,500 volt, three-phase Scott connection; the other bank containing two 250-kilowatt, Westinghouse, oil-insulated, water-cooled, step-up transformers, 50 cycles, 500 volt, two-phase, to 17,500 volt, three-phase, with six 18,000-volt Westinghouse lightning arresters. This system is operated by twelve hand-controlled, three-pole Kelman-Barrie type oil switches, connected for 15,000 volts.

### Mentone Power House.

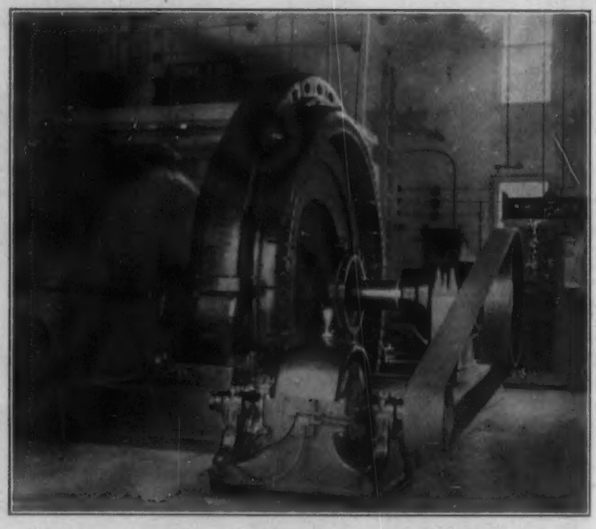
The Mentone power house, three and one-half miles east of Mentone on the Santa Ana River, is one of the new-

HEAD WORKS OF MENTONE POWER CO.
WATER CONDUIT SYSTEM

est of the Pacific Light and Power Company's plants, having been installed in 1905.

The intake dam three miles above the power-house site is a substantial structure built of reinforced concrete with wooden gates, hand-operated. The conduit system consists of open flume, tunnels, and one canyon is crossed by an inverted wooden siphon sixty inches in diameter. The tunnels are seven in number, one being 1400 feet long, and at present a tunnel is being driven at the lower end of the conduit to replace one long wooden flume.

At the end of the conduit on the steep hillside, 350 feet above the power house, a small forebay, 12x18x8 feet, was constructed of reinforced concrete, from the bottom of which the force main drops to the power house. Screens cover the opening into the main, which is riveted steel pipe, thirty-six inches in diameter. The spill-way, on the upstream side of the forebay, discharges into the river through a ravine in the hillside.



INTERIOR OF MENTONE POWER HOUSE

The power house is built of reinforced concrete, 50x40 feet, with corrugated iron roof. A stationary 20-ton crane was erected on the side walls for use in the installation of the machinery.

There is in operation one 1500-kilowatt, revolving field, Westinghouse, 50-cycle, two-phase, 2200-volt generator, 300 revolutions per minute, direct connected to one 56-inch Stillwell-Bierce Smith Vaile 2750-horsepower water-wheel with a Type "B" Lombard governor, operating under a 352-foot head. One 22½-kilowatt multi-polar, 125-volt, Westinghouse, direct-current generator, belted to the fly wheel of the generator, is used as an exciter.

In the transformer room, which is built just off the

MENTONE POWER HOUSE

main building and made fireproof, there are two 750-kilowatt Stanley step-up transformers, oil insulated, water cooled, 50 cycle, 2200 volt, two-phase, to 17,500 volt, three-phase, with three 30,000-volt Westinghouse lightning arresters, connected on the high line, one on each leg. There is a one-panel switchboard with two 3-pole, 15,000-volt, hand-controlled Kelman oil switches.

## SOME POWER TRANSMISSION ECONOMICS.

By Frank G. Baum.

In designing power transmission systems, it is always well to bear in mind that the ultimate development of the art and of the country has not yet been reached.

In the early days of railroading, the roads and equipment were not of the present trunk-line standard. Light rails, engines and cars, and unfenced right-of-way, and unballasted roadway sufficed. To construct at that time up to the present standard would have meant bankruptcy. Even now the manager or engineer who would build his branch lines of the same standard as his trunk lines, would invite a receiver to take charge of the road.

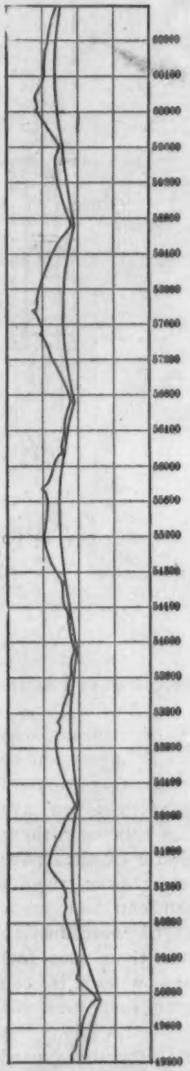


FIG. 1.—Profile of Mountain Pole Line. Distances in ft.

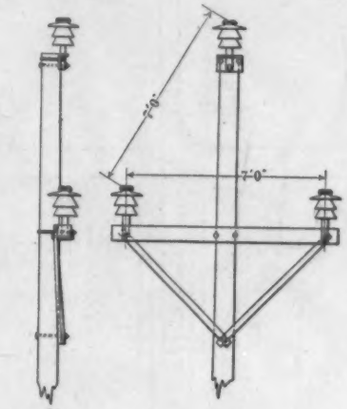



FIG. 2. Structure 1.—Spans up to 500 ft. 7-ft. triangle. Single construction. On corners, double arms and plates and one pin.

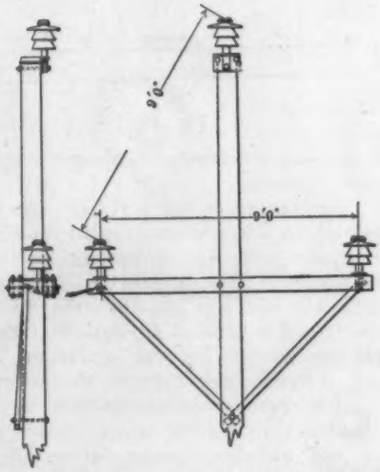



FIG. 2. Structure 2.—Spans 500 ft to 700 ft. 9-ft. triangle. Double arms and plates, one pin. On corners, double arms and plates and two pins.

The same conditions hold true for power plants and transmission lines. The wise manager or engineer builds to meet existing conditions, looking into the future as far as he can. He can not afford to build duplicate plants and lines for every case, nor build all his lines on private rights-of-way, with steel towers and other refinements and safeguards. He can not afford to build a duplicate transmission line, at an additional interest cost of $5000 per year, when the probability of an interruption, which will cause a loss of revenue of $500 per year, to a consumer, is extremely remote.

It may not be as difficult to determine the proper power station and line to build when unlimited capital and ideal power conditions exist as when there is restricted capital, limited revenue, and low-priced power at the consumer's end. Although in the latter case the amount of money to be expended may be much less than in the former, even more thought is demanded of the engineer, for, in the former case, having ample resources, he builds as best he can, while in the latter he must be a judge of conditions and see far ahead, in order that the line which he builds may earn money and at the same time be capable

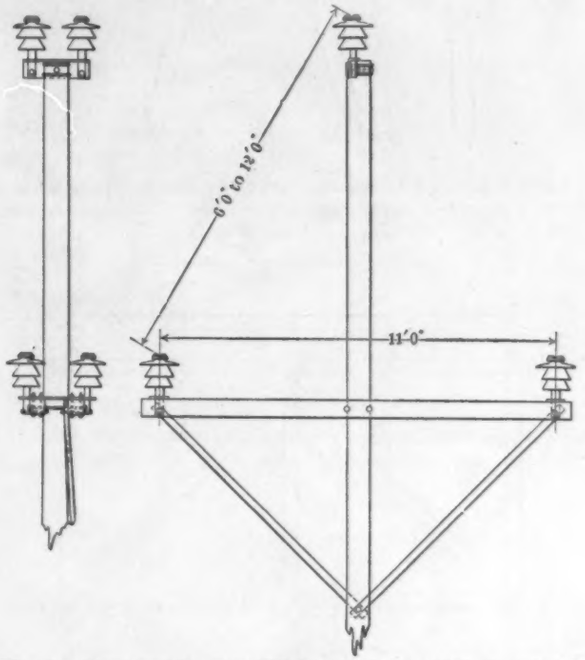



Fig. 2. Structure 3. spans 700 ft. to 900 ft., 1100 ft. triangle. Double arms and plates and two pins.

of extension on some plan to meet the growing needs of the country and business.

To illustrate the necessity of doing things in inexpensive ways in the early development of an art, a business, or a country, some examples are given of the work done on the system of the California Gas and Electric Corporation. Along some of the lines where the load is small, one wire only is run to the sub-station, an inexpensive building, and one transformer, with ground return, is installed. One-phase motors are used. For larger stations, sometimes up to 500 kilowatts, two wires are run to the sub-station, and, by using ground return on the primary and open delta on the secondary, three-phase motors are operated. Loads as large as 1500 kilowatts have been carried to a distance of one hundred miles on two transformers, Y-connected on the primary, with grounded neutral, and open delta on the secondary. Neither the power consumer nor the power-house operator has noted anything unusual.

For larger sub-stations a single three-phase transmission line supplies the load, even where the length is fifty miles or more. The consumer can not afford to pay for a duplicate line when the output per year of the factory is practically unaffected by interruptions. Interruptions amounting to one hour per month would be one-seventh of one per cent of the total time, and the power company that has an average of an hour's interruption per month is certainly giving very bad service. It is evident that the construction

* Paper read before American Institute of Electrical Engineers, June 28, 1907.

of a duplicate pole-line for such service is entirely unwarranted.

As to the construction of pole-lines, it has been found that in some parts of the West where cedar poles may be purchased at a low price, this class of pole-lines is still

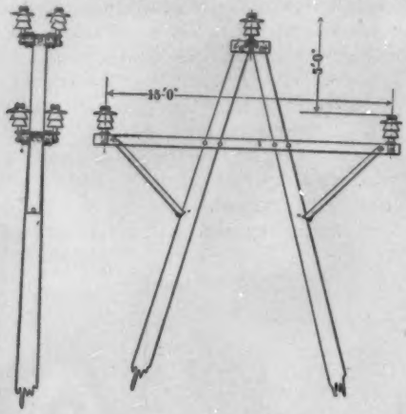



FIG. 2, Structure 4.—Spans over 900 ft. to 2000 ft. 16-ft structure. Double 6-in. by 6-in. arms, plates and two pins. Two-pole structure.

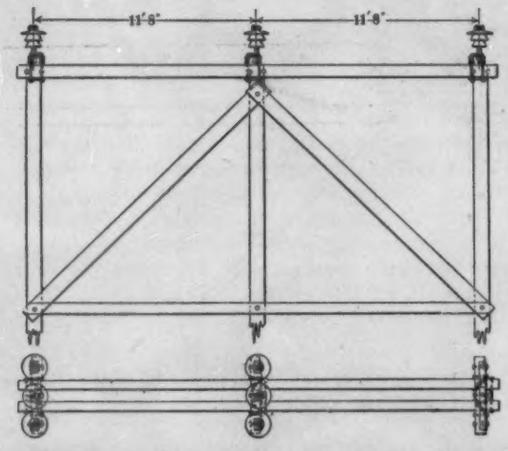



FIG. 2, Structure 5.—Spans 2000 ft. to 3000 ft. 24-ft. structure. Double 6-in. by 8-in. arms, plates, and three pins. Three-pole structure.

the most economical, and everyone must admit that this type of construction has proved remarkably effective. Of course, under certain conditions tower lines only would be considered, but two wooden pole lines entering a city by two different routes will give greater reliability than any two-circuit tower line that can be built. The cost of a two-circuit tower line would be as great as that of two pole lines. A line using tower construction requires a private right-of-way, and in a new country it may not be possible to pay from the earnings the interest on the increased cost of the right-of-way, as well as on the tower construction. The engineer, of course, always prefers the best construction, but he must consider the net revenue to be derived from an enterprise in a given number of years. In mountain sections, the economies of line construction lie in the use of the hills for the structures and in using long spans. In some cases the amount saved in clearing, in poles, insulators, and labor will amount to 50 per cent.

Figure 1 shows a profile of a line recently constructed, the middle section of which consists of a series of spans varying in length from 700 to 2700 feet. It will be seen that by taking advantage of the hills to form the greater part of the height of the structure great economy results. A span of 3000 feet, with an allowable sag of 300 feet, would, if on the level, require towers over 300 feet high, while in this line on similar spans, simple wooden pole structures thirty feet high are all that is necessary. The profile of a line of this kind is first determined, and the span-length and structures designed so that the wires clear

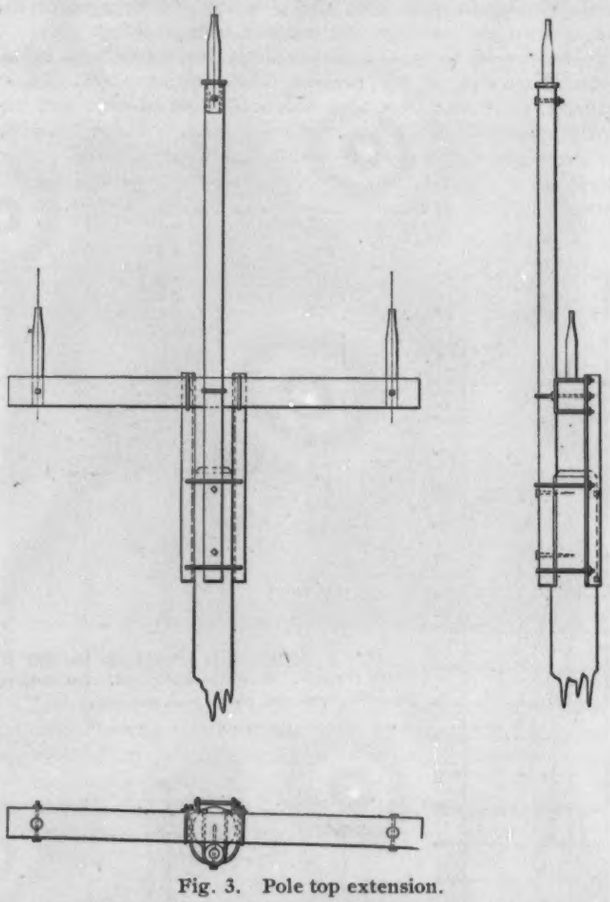


Fig. 3. Pole top extension.

the ground sufficiently. This gives an economical and satisfactory line.

On long spans the wires are spread at the structures as shown. In addition, the top or middle wire is given ten to forty feet less sag (depending on the span) than any of the others. One of the outside wires is also given five to twenty feet less sag than the other. In this way there is obtained a vertical separation at the middle of the span; and ten feet of vertical separation is better than twenty feet of horizontal, because the wires then can not come together, even when acted upon by gusts of wind having a tendency to lift the wires. Spans greater than 2000 feet are not installed except in certain cases where it can scarcely be avoided. Spans of 600 to 1500 feet give the best line.

Figure 2 shows standard types of pole structures used on some of the mountain lines recently constructed in California. Structures of this kind are also sometimes used for river crossings where the cost of steel towers is prohibitive, or the time too short to install them. These are sometimes over one hundred feet high.

Referring to old lines which were constructed ten, or even five years ago, nearly all the lines were built with forty poles to the mile, using 35-foot poles. Now the tendency is to use longer spans on account of the lower cost and the reduced number of insulators or weak points in the line. Some of these old lines have later to be reconstructed for a higher voltage, and in order to obtain a reasonably good line and also to reduce the cost for insulators and future line maintenance it is advisable in reconstructing to

reduce the number of poles. To do this, the supporting points of the wires must be raised higher above the ground. In order to accomplish the result of reinsulating and recon-

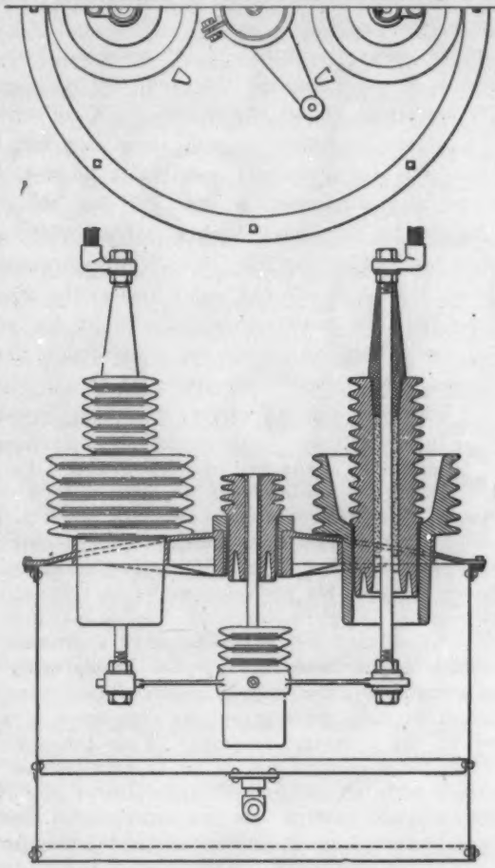


Fig. 6. Modern Type of oil switch.

structing several hundred miles of line, which would have kept all the insulator factories busy for two years furnishing insulators for the old type of construction, the pole-top

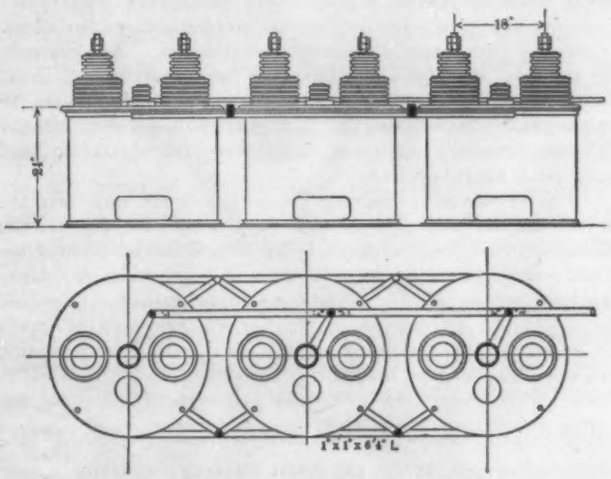



Fig. 7. Three-pole grouping of oil switches.

extension shown in Figure 3 was used. This has proved effective. By using this pole-top extension every other pole is taken out, with a saving of $9 per pole for new insulators, with the additional salvage of the old poles, arms, pins and insulators. Where sufficient height can be obtained by putting the arm below the top of the pole this construction may be simplified in the fastening of the arm and pipe to the pole.

Another important adjunct of the transmission line is the switches, oil and disconnecting. It will be found that

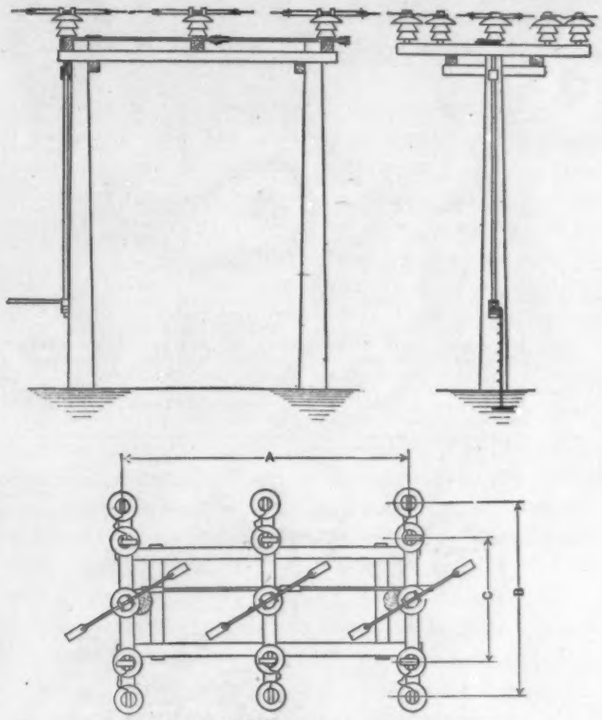



Fig. 8. Out-door two-break air switch.

the same arguments regarding economical line construction apply to switches. Five years ago no one was sure of a

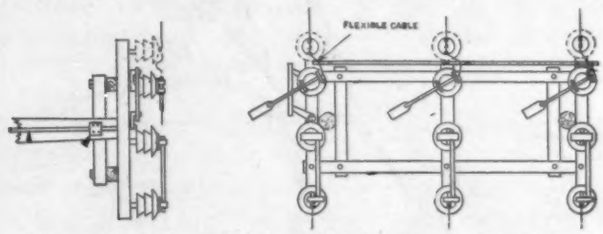



Fig. 10. Out-door switch and fuse for small sub-station.

high-tension switch, and it would have been folly to install expensive switches of the first type that suggested itself,

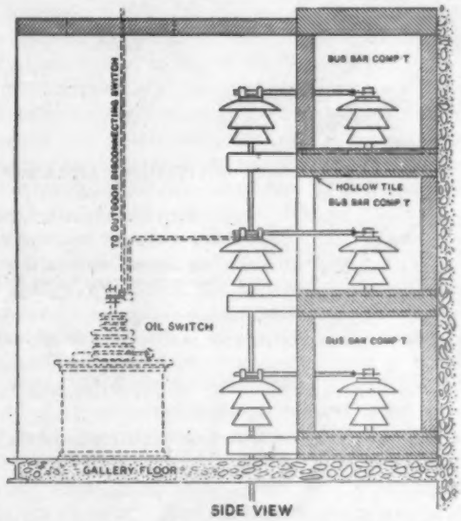



Fig. 11. Oil-switch in compartment, showing disconnecting switches.

without giving them a thorough trial during several years

under operating conditions. In selecting switches and structures for high-tension lines, it is well to bear in mind that the ultimate development has not yet been reached. In solving our switch problem this was kept in mind at all times.

The first high-tension oil switches were made as inexpensive and as simple as possible, and were as shown in Figure 4. These operated so satisfactorily that we became convinced of the success of the type and soon changed to a more substantial form, as shown in Figure 5. They are generally installed for hand-operation.

Although we have more than one hundred of these switches on our lines, and nearly 1000 miles at 60,000 volts all tied together, and over 50,000 kilowatts in generators operating on the lines at all times, the switches, although cheaply constructed, have given excellent results. All line

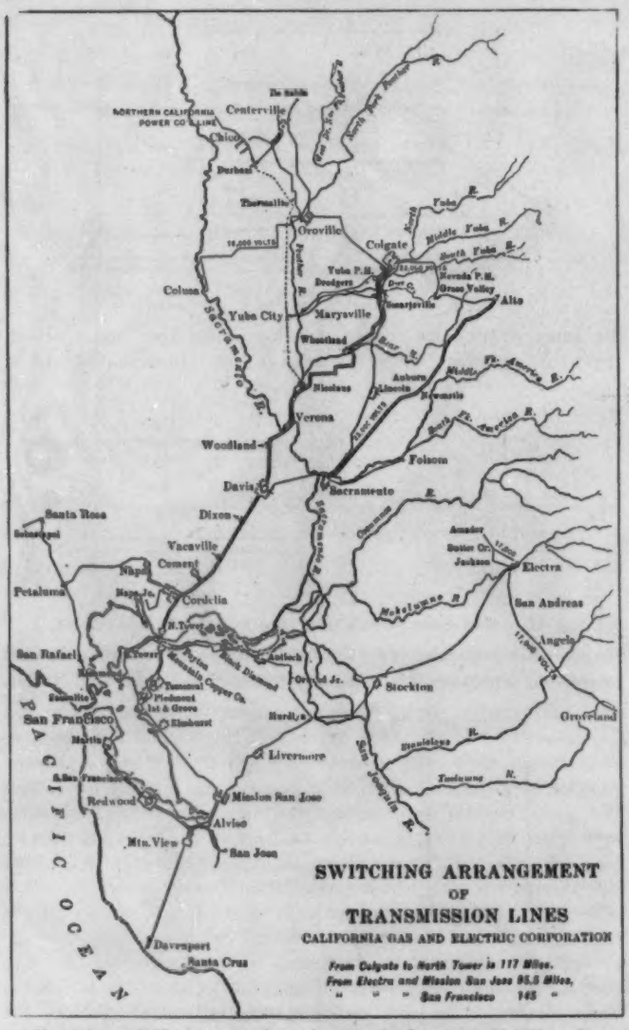



Fig. 12. All lines not otherwise marked are at 60,000 volts.

switching is done on these high-tension switches, and the plants and lines are separated thereby in case of trouble. The stations are synchronized at sub-stations, which are 100 to 150 miles from any power station.

We have now adopted the type shown in Figure 6, two-break switches for the ordinary station and four-breaks in each tank for the heavy service. These switches are grouped in three-pole arrangement, as shown in Figure 7.

For small sub-stations and for line-sectionalizing switches and for disconnecting from bus-bars, switches of the type shown in Figures 8 to 11 are used. In handling the high-tension lines these switches are used as much as the oil switches.

Figure 12 shows the lines and the main-line switching arrangements of the California Gas and Electric Corporation. AO represents an oil switch and An X an air-break switch. A glance at Figure 13 will show that our high-tension lines are also practically distributing lines, as loads are taken off at a great many points. We have more than 100 sub-stations on our lines. Such a system is, of course, much more difficult to operate than a straightaway line with a power station at one end and a load at the other.

On the hydraulic construction and also on the power-house and sub-station installation and construction, the engineer is required to devise something that will pay the largest net income in a given number of years. Sometimes he is called upon to make installations on the assumption that the plant is to be abandoned in a few years. Of course, the engineer will be criticized if he puts in a plant to meet present or apparent future needs and, due to some change in the industry or development of the country, the plant must be remodeled later. But it is the business of the engineer to solve his problems as he sees them.

I have given these examples of line and switch construction to show that **the best solution of a problem may be one which accomplishes the purpose satisfactorily with the least amount of money,** on account of the changes in design which become apparent as our experience is broadened and as the industry develops. That there will be further advances is certain, but, as far as high-tension work is concerned, little of the present apparatus—transformers, insulators, switches—need be thrown away; for should the line voltage be forced up, the present apparatus may be used on the lower voltage lines. And, too, the high-tension transformer is so flexible in its operating voltage connections that use can always be found for it. It is very probable that in time higher voltage trunk lines will be built which will feed into the present lower pressure (60,000 volts) lines at various points, using the present 60,000-volt lines for the primary distribution, stepping down to about 11,000 for the regular factory distribution. An example of work of this kind is shown by our system. A great many miles of comparatively low-tension lines—10,000 to 23,000—have been changed to higher voltage, but all the old-line material, switches, insulators, transformers, etc., have been again utilized.

The saving in conducting capacity and the improvement in the service and the salvage have well paid for all the changes. No doubt a part of the future work of the electrical engineer will be to redesign and reconstruct the high-tension systems for the economies to be gained. The ease by which the change to the higher voltage may be made as necessity arises is encouraging alike to the transmission engineer and to the investor.

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Portland, Ore.—The big dredger recently built at the East Side shipyards for the Swift Packing Company is now completed. It will be set to work near the Peninsula this week, cutting a channel to the Columbia. This will permit the entrance of vessels to the great docks to be there constructed. This is the beginning of the work that will build a tremendously active suburb to Portland, and add enormously, within the next few years, to the importance of this city as a great port. This added industry will have a value that cannot be overestimated.

## POWER FROM WASTE GASES—FOR ELECTRIC RAILWAY OPERATION.

The evolution of gas power in Europe has established efficient and reliable means to utilize profitably for the generation of heat and power the gases which are generated from the raw materials of the iron industry as a by-product, and which were formerly wasted. This means offers the desired possibility of reducing the cost of transportation to a very low figure. The reason why the power for operating an electric railway for the transportation of raw materials and finished goods through iron and coal mining districts or from one to the other, can be gained at such low cost, rests besides with technical details, with the fact that modern coal mines and coke ovens working with by-product recovering, as well as blast furnace plants and steel works, must, in order to work with maximum industrial economy, possess their own electric central station for generating their power to drive the various auxiliary machines like pumps, hoists, fans, motors, etc., all over the works. Practice obtained in continental iron works has proved beyond doubt that the application of gas engines, as prime movers in such central stations, is by far the most economical of all known methods, the total cost of operation having been reduced in actual practice to about one-third of the value of steam drive. By simply extending the capacity of the central stations, which is quite possible, by a judicious application and distribution of the uses of waste gases within the works, we can generate at no additional heat cost the entire energy, not only for transforming the original ore into marketable steel products, but also to transport the raw materials and finished products to their respective places of destination, provided that the latter fall within the commercial distribution radius of the furnace plant, coke ovens or coal mines or all of them.

It is a well-known fact which need not be here developed in detail, that of the total quantity of gas generated in a blast furnace plant about 50 per cent is required for use within the plant, including losses at the furnace top and in pipings, viz.: for driving blowing engines, heating blast stoves, operating the gas cleaning plant, and generating electric energy in the lighting station, while the rest, representing an amount of 25 horsepower per ton of pig iron produced every twenty-four hours, is available for outside purposes or sale.

Modern combined works often possess their own coal mines and coke ovens, where the coke is made which is later shipped to the furnace to be charged, together with the ores for smelting the latter. For every ton of coal transformed to coke in twenty-four hours, there are 6 horsepower available for other uses.

The development of modern gas producers has created a third and very powerful resource for the production of energy, in addition to what is gained as a by-product from furnaces and coke ovens. This is the utilization of inferior grades of fuel in coal mines, such as slack, residue, refuse and minerals, which drop from the conveyors and tipplers; in short, all that was formerly wasted. Deducting losses through natural deterioration and auxiliary requirements, one ton of culm generates 25 horsepower per 24 hours, which were formerly thrown away, but by the installment of such gas producers are now available for sale or other purposes.

Summarizing, we have in blast furnaces plants 25 horsepower per ton of pig iron produced; in collieries, 6 horsepower per ton of raw coal, and in coal mines, 25 horsepower per ton of waste material per 24 hours, available for covering the transportation requirements in a combined plant.

Owing to the protective tariff, an efficient production in the iron industry of the United States and Germany—which are now the two foremost iron producers in the world—is only possible by combining in one hand, coal and ore mines, blast furnaces, steel plants, rolling mills, in short all that is necessary for converting the raw material into finished goods. In modern combined works of such magnitude as exist in the United States and Germany, all factors are therefore under control of the management of the trust or syndicate, except the factor of transportation, which in the first country is largely controlled by the railroad companies, in the second, by the government. For various well-understood reasons, which are now being revealed to the eyes of the public, it is very desirable for the American iron industry to also lay hold of this factor, so as to be altogether independent of outside arbitrary measurements and certain of self-controlled stability of transportation facilities. If the iron industry would possess their own railroads for transporting their goods, or if ironmasters or owners of coke oven plants and coal mines would even (as power producers) deliver electrical energy to the railroads as consumers, they would control the situation of the iron market, instead of having to part with their profits in order to reduce tariff rates.

In conclusion, it may be said that there is nothing in the above project that requires the development of new inventions or the experimenting with untried devices. All the technical factors of the problem have been solved individually long ago, and it is only their proper adjustment to American conditions and their judicious combination to one great end which makes this proposition an attractive subject for the engineer and economist.

The successful development of the electric locomotive and the improvement made in the generation and transmission of high-tension electric current have opened up a new era in electric railroading, and the investing public is greatly interested in the possibilities of long-distance rapid transit, connecting great centers of population or industry in competition with existing steam railroads. The greatest objection hitherto advanced by antagonists against the realization of the scheme was that where "cheap" water power was not available and fuel must be burnt at the central station to produce power for driving the generators, then the operating expenses would become entirely too high on account of the cost of coal or other fuel consumed and of the increased labor necessary for operating the plant. It is gratifying to see from the information developed above that the great iron and coal producing centers of the United States have inherent in them an enormous amount of energy which is latent at present, but which when rightly used and husbanded will yield from four to five million horsepower annually at no additional heat cost, and there can be no doubt but that some day it will be called upon to furnish its share to the novel equipment which will accomplish electric traction economically on a large scale.—F. E. Junge, in "Cassier's Magazine."

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# EDITORIAL.

**LESSON OF THE CARMEN'S STRIKE.**

By the time "The Journal" is in the hands of its readers it is possible that the strike of the carmen, which has lasted two months, will have been declared at an end. In a measure, such a declaration is perfunctory, since the back of the strike was broken at its beginning, and all along it has been but a palsied thing. The desire of the leaders of Trade Unionism to wash their hands of Cornelius' misdoings and to restore opportunity for Union workmen to use the cars was evidenced last week by their waiting upon Mr. Calhoun and sueing for peace. Richard Cornelius, president of the late unlamented Carmen's Union, Local Division 205, was not among those present. Several weeks ago when Mr. Calhoun appeared before the Conciliation Committee of the Civic League, such honest and prudent labor leaders as Mr. Tracy, of the Typographical Union, and others, were free to admit that Mr. Calhoun's position was unassailable, and that the strike should never have been called.

The obvious lesson of the latest carmen's strike is that unless there is reasonable grievance and just complaint on the part of the strikers, the public not only refuses sympathy with the strike, but rebels against it its unreasonableness and injustice. The cessation of a universal public utility, such as street car service, involves incalculable calamity upon a community. A street car strike means paralysis of trade, interference with industry and untold discomfort and inconvenience to every individual in pursuit of his daily business. Moreover, the history of strikes in San Francisco is that such industrial dissensions cannot be conducted without shameful violence and lawlessness. Nor can the late Carmen's Union be absolved from responsibility for such disorder, and, indeed, in this latest strike their participation in lawlessness has been brought home to its members.

In the meanwhile, the history of the trouble between the United Railroads and its employees has been so tortured by most of the daily newspapers that it may be well to review briefly the actual facts.

The United Railroads assumed control in March, 1902. The rate of carmen's wages on the Market Street line was then twenty-two cents an hour, and on some of the other lines it was twenty-one cents. Soon after the new company was organized, the carmen struck for a flat rate of twenty-five cents an hour, which was granted. In 1903 the carmen again demanded an increase, threatening to strike. This demand was arbitrated by W. D. Mahon, president of the National Association of Carmen, and by Mr. Calhoun, with Mr. Oscar Strauss, now Secretary of Commerce and Labor, as the third arbitrator. A scale was agreed to as follows: Twenty-five cents per hour for the first year; twenty-six and one-fourth for the second, and twenty-seven and one-half for the third. On May 1st, 1905, a two-years' contract was entered into by which the United Railroads agreed to pay this rate of wages for the two ensuing years. Fifteen months later, the carmen deliberately violated this contract. Nevertheless, Mr. Calhoun consented again to arbitrate the question of wages and hours, as soon as the men returned to work. The Arbitration Board, of which Mr. Chief Justice Beatty was chairman, fixed the rate of wages at thirty-one, thirty-two and thirty-three cents an hour for the first, second and third years, respectively—an advance of twenty-two and one-half per cent. over the rate of wages fixed by the carmen's contract, and an increase of over fifty per cent. above the rate of wages paid when the United Railroads acquired its property. The decision of the last Board of Arbitration established a rate for the period terminating May 1, 1907, and it was hoped that the negotiations between the employees and the company would extend the adjustment beyond that date.

The leaders of the Carmen's Union, however, declared yet another strike, demanding a flat rate of three dollars a day for an eight-hour day. In violation of the Union's own general laws, Cornelius and the Conference Committee not only did not offer arbitration, but refused Mr. Calhoun's proposal of arbitration, which he made against his own convictions of what was reasonable and fair, because he was determined to do his utmost to preserve the peace, and to contribute to the reconstruction and prosperity of San Francisco.

This, then, is the record of Local Division 205, of the Carmen's Union. Within a single year it struck once, in violation of its solemn contract, and twice, in reckless disregard of its own general laws. It seems certain that in its last suicidal strike the Carmen's Union was encouraged by the fact that officials of the United Railroads were facing indictments by the Grand Jury, and by the delusion that the United Railroads had been made so unpopular that the strike would receive the sympathy and support of the people. Alliance with the "Big Stick," and the support of the District Attorney's office, proved of small avail to the strikers in their endeavor to enlist public sympathy. The people of San Francisco could see neither sufficient right nor reason in the carmen's complaint for the industry and reconstruction of this city again to be impaired so seriously by the cessation of car service. In this Union-ridden town, in which the boycott has been used so successfully as a bogey-man to timid merchants, and in which the interference of pickets has been so vexatious, there was a healthy and bold determination on the part of the majority of the third party to all strikes—the passengers and consumers—to exercise their rights of individual liberty to patronize the cars as suited their convenience.

Mr. Calhoun is not alone in his victory in the street car strike. Henry T. Scott, president of the Pacific Telephone and Telegraph Company, has also demonstrated to an incredulous community that it is possible to operate a great public utility without servile dependence upon a Labor Union, and without submitting to unreasonable dictation. And a similar battle is now being waged between the telegraph companies and their operators.

In each of these three strikes, the disgruntled employees were foredoomed to failure. Incalculable damage has been done by the strikers, and they have gained nothing. By the victory of Mr. Calhoun and Mr. Scott, a great fundamental principle of American citizenship has been established for the first time in many years in San Francisco; and "The Journal" sincerely hopes that the principle of the liberty of the individual to buy or sell labor as it seems best to the individuals concerned, may forever be maintained faithfully in this city. We reaffirm our conviction that the peace and prosperity of San Francisco depend on the preservation of this sacred right. The flag of the "Open Shop," which indeed is the flag of a free republic, has been raised in this city by Patrick Calhoun and Henry T. Scott, fearless and devoted, because they were conscious of the right. May it never be pulled down!

## PERSONAL.

J. H. Harper is consulting engineer of the Washington Electric Railway Co., now working near Sultan, Wash.

J. H. Wise, head of the construction department of the California Gas and Electric Corporation, has returned from a trip of inspection of their Deer Creek plant.

A. S. Kalenborn, formerly assistant electrical engineer of the California Gas and Electric Corporation, has charge of the newly established offices of F. G. Baum & Co., 497 Arcade Annex, Seattle, Wash.

J. W. Goodwin, president of the Oro Light and Power Co., has returned from Oroville, Cal., where he has been on business connected with the proposed Portland cement plant, which the above company intends putting in.

## TRADE CATALOGUES.

The Ohio Brass Co. of Mansfield, Ohio, in Catalogue No. 7, Electric Railway and Mine Haulage Materials and Supplies, have issued a valuable compendium on the subject of electric railway equipment that should be in the hands of everyone interested in this work. The book is well bound and contains 582 pages, divided into ten sections, illustrating and describing rigid and flexible pole brackets, Catenary construction, overhead line material, track bonding devices, devices for third rail systems, car equipment, construction equipment and tools, and tables and formulae.

Bulletin No. 4506 from the General Electric Company, Schenectady, N. Y., displays the advantages of the Edison Gem (Metallized) Filament 50-watt Lamp. The new Gem filament is obtained from the ordinary carbon filament by subjecting it to the heat of the electric furnace, rendering it more refractory and capable of withstanding a higher temperature for a given life and deterioration. It is claimed that this results in a 25 per cent increase of candlepower, with total watts unchanged. Bulletin No. 4516 illustrates and describes M. R. circuit breakers for electric railway cylinder controller equipments. Supplement to Bulletin No. 4495 shows new types of direct current universal frame fan motors.

The American Spiral Pipe Works, Chicago, Ill., send a handsomely illustrated catalogue of their forged and rolled steel pipe flanges, which includes not only a complete list of the standard flanges and a partial list of the various forgoings that they manufacture, but also a short description of the more important features of the forged steel flange.

Bulletin No. 4509, from the General Electric Co., Schenectady, N. Y., contains an interesting illustrated account of electric train lighting. No. 4514 illustrates and describes the Thomson inclined coil portable indicating instruments, types P and P-2. No. 4515 discusses auxiliary contactor equipments for cylinder controllers.

## TRADE NOTES.

In order to handle the business in electric generators and motors in Southern Ohio, the Cleveland office of Crocker-Wheeler Company, of Ampere, N. J., has found it advisable to open a sub-office in the Columbus Savings & Trust Co. Building, Columbus, O. The sub-office will be in charge of Chas. W. Cross, formerly of the Cleveland office of Crocker-Wheeler Company.

## INSULATION.

It is really surprising how little explored is this enormously important field of research. What information we have on the subject is contained in the proceedings of the various learned societies, and the jealously-guarded private information of the manufacturer. That part of the subject dealing with the insulation of machines has recently been very clearly dealt with by Turner and Hobart. The majority of electrical engineers look upon the subject of insulation as of quite minor importance. He knows what the insulation resistance will be, and the voltage that would break it down, but what these would be after the job has been running some time he does not know, because the busy manufacturer has not time to go into that sort of thing; nevertheless, it is of vital importance to the advancement of the industry.

In examining the scientific basis on which effective insulation depends, it is considerable help towards a definite conception of the electric field to assume a simple dielectric made up of positive and negative cells in chains, and on applying oppositely charged electrodes to the end of a section of the dielectric, the positive cells are drawn one way and the negative cells the opposite way—i. e. to the positive electrode—and when there is electric displacement—i. e., the positives and negatives slip at all past each other.

The total mechanical force acting upon the whole substance within any element of volume is zero—i. e., supposing the dielectric to be a gas, a little metal ball hung by a silk thread in it would be neither charged nor moved. Hence the "action at a distance theory." Also, it is clear that the dielectric experiences a tension parallel to the intensity, and a pressure in all directions perpendicular to the intensity. In all ordinary substances (which may be considered as mixtures of ether and matter) the electric displacement is greater than in free ether for a given intensity. In perfect insulators, according to our conception, the cells cannot slip over one another. In this case electric displacement only can accompany any electric intensity. In imperfect insulators the cells slip slowly, and in conductors they slip rapidly. Taking this point of view, that every atom of matter is made up of small charged particles called electrons, and that no charges exist except the charges on electrons, it is possible to offer an explanation of thermo-electric and piezo-electric phenomena and the various other phenomena such as ohmic heating and electrolysis when there is (1) mechanical tension and compression (positive and negative electrons move in the same direction); (2) temperature disturbances (positive and negative electrons move in the same direction); (3) electric polarization or electrolysis, or simply conduction (the positives and negatives move in opposite directions). And a good insulator has to stand all three in some form or another. It must also be able to exclude moisture, not take up much room, withstand acids, last a long time, be incombustible, flexible and easily worked and cheap. Generally insulation consists of a mixture of things, such as pure rubber, vulcanized rubber, impregnated cotton or paper, and varnish, and oil and air; and this is probably the most important cause of insulation troubles, because a different amount of poliarization or electric displacement through these different dielectrics is obtained. The displacement being greater in dense bodies than in lighter bodies, being least in vacuo, the effect of this is to cause an unequal distribution of pressure over the insulation. As to the influence of the temperature of the insulation on its dielectric strength, when the temperature goes up, the dielectric strength goes down. Now, the temperature of an electric light station is not infrequently 100° F., and with the 70° F. rise of temperature usually specified, this brings the working temperature of the insulation up to 170° F., and if one happens to have been running on a 20% or 30% overload for a couple of hours or so, it will be quite possible to break down the insulation unless one has had pressure tests made at high temperatures, because the breakdown pressure will have probably dropped to something under three-fourths of what it would be at the ordinary temperature of the air, probably less than that if it has been on some time, owing to the effect that repeated heating, cooling, and stressing has had upon it.

Data concerning the ageing of insulating varnishes published by the manufacturers of dielectrol, show that although the initial insulation of their product may be low, yet after eight or nine months of constant use it is as good as new, while the other varnishes have deteriorated enormously. It is a pity that there is not more information of this sort obtainable, but, unfortunately, such tests are difficult and expensive. The deterioration of varnishes, etc., is largely due to mechanical vibration, which powders them up, but the more flexible insulators deteriorate by charring. Unfortunately, most of the insulators are also bad conductors of heat, so that if heat is generated inside, as in the conducting wire or in the body of the insulation, it is not at once radiated and conducted away. In consequence of this, various impregnating materials have been put upon the market, which, while scarcely, if at all, inferior in insulating properties, are of such composition as to facilitate the escape of heat from the interior of the coils. This is the more necessary as there is an energy loss which shows itself in the form of heat in the material itself, due to conduction through the ohmic resistance of the dielectric, the energy consumed in the way being, of course, proportional to the square of the voltage. This becomes considerable in high-voltage machines. The greater the heating and the more the stuff chars the greater becomes the conduction current, and if the rate of generation of heat exceeds the rate of cooling, the temperature will rise until the insulation breaks down.—O. J. Williams, in paper read before the Newcastle local section of the Institute of Electrical Engineers.

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## BRASS RECOVERY.

One of the most interesting and unique processes for recovery of brass and copper lost in the fire of last year, is now being operated on the old site of the W. T. Garrett & Co. Foundry, under the personal supervision of Mr. McA. Logan. The debris from the foundation, 150x50, was screened several times, large quantities of brass and copper being recovered, in various sizes, but the fine particles could not be sorted out, and in many places, where there was no cement on the floor, melted metal penetrated the ground to a depth of several feet. A well was sunk in the bottom of the basement, 8 feet below the tide water level. Over this a 2½-inch centrifugal pump is installed, driven by a 2½-horsepower Westinghouse motor. This pump discharges into a sluice 60 feet long, with wooden riffles about 10 feet apart. The debris from the foundation site is shoveled up and dumped into this sluice box, and the brass and copper caught in the riffles, while the lighter stuff is carried down and deposited at the foot of the sluice, and hauled away. The water then runs through screens back to the mill, and is used over and over again. This small plant, at an actual cost of but $150, and operated at a cost of about $15 per day, yields a quantity of brass and copper amounting to one ton per day, which is worth from six to seven cents per pound. Articles of incorporation have been filed under the name of the California Salvage Metal Recovery Company, with Mr. Logan as president and general manager.

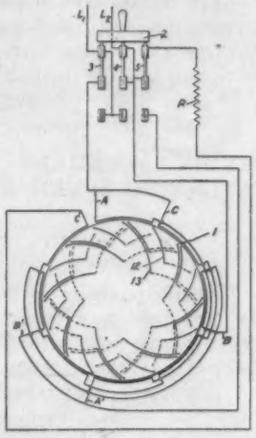
## PATENTS.

### Electric, Gas and Water.

Specially reported for the Journal of Electricity, Power and Gas.

### DYNAMO-ELECTRIC MACHINE.

No. 856,414. A dynamo-electric machine having main and interpoles, the main pole faces being symmetrically

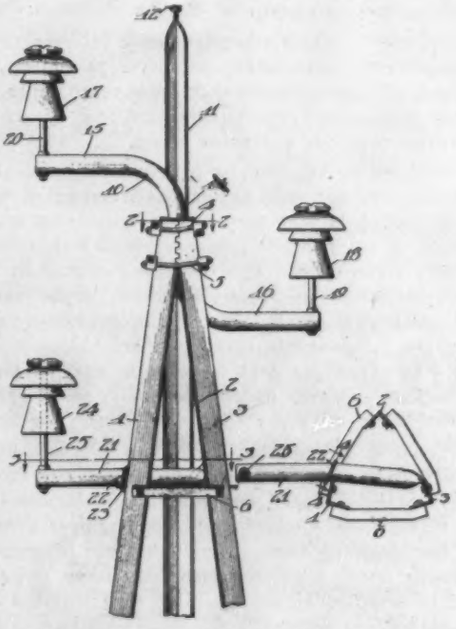


spaced about the periphery of the armature while their cores are unsymmetrically spaced, thereby allowing space for the coils of the interpoles.

**Charles A. Mudge, New York, N. Y., Assignor to Electro-Dynamic Company, Bayonne, N. J.**

CROSS-ARM FOR TOWERS. 857,101. La Verne W. Noyes, Chicago, Ill.

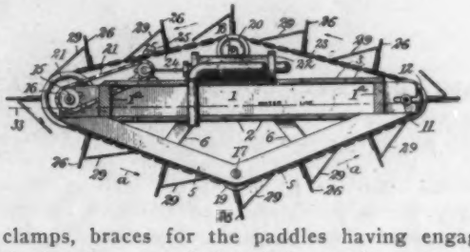
The combination with the post of a tower, of a cross-arm therefor having a portion by which it is supported



at right angles to the remainder, and a second arm having one end connected to one leg of the post and an intermediate portion secured to and supported by one of the braces of the tower.

HYDRAULIC MOTOR. 857,501. William R. Tuttle, Asotin, Wash.

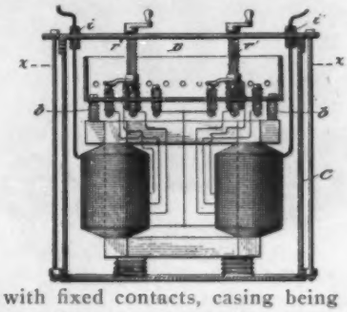
A hydraulic motor comprising endless traveling chains, links of which are provided with clamps, paddles carried



by the clamps, braces for the paddles having engagement with both the clamps and the chains, and means whereby the paddles are caused to move at gradually increasing depths.

ELECTRICAL TRANSFORMER. 857,062. John D. Hilliard, Albany, N. Y.

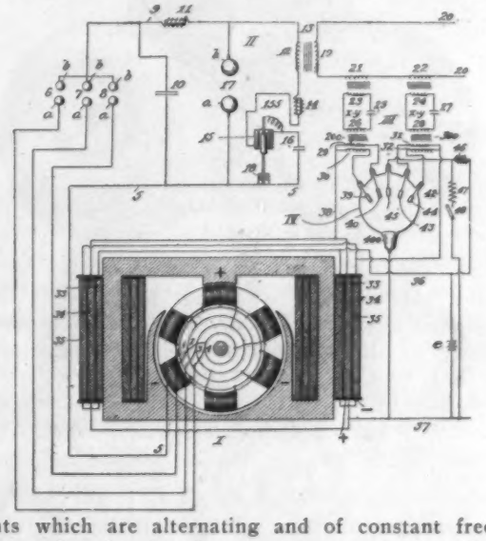
In an electrical transformer, a core with primary and secondary windings, a casing and a switch within casing, having two or more fixed contacts connected to different points on the transformer windings, a movable contact for



co-operating with fixed contacts, casing being filled with oil to a sufficient depth to cover all of contacts, and an operating handle for the switch projecting out of the casing and provided with indicating points corresponding in position with the contacts.

PROCESS FOR GENERATING HIGH-FREQUENCY ALTERNATING CURRENTS. 857,560. Maurice Leblanc, Paris, France, assignor to Westinghouse Electric & Manufacturing Company.

The process of transforming unidirectional currents into



currents which are alternating and of constant frequency, which consists in charging a resonator, having R2 small with respect to , with unidirectional currents for one portion of each alternating period, and discharging the resonator through a path of low resistance during the other portion of each alternating period.

# INDUSTRIAL

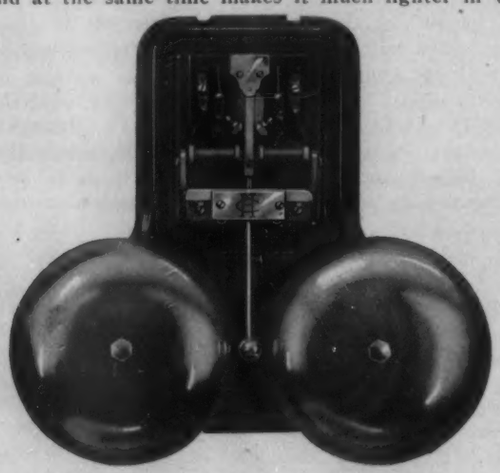
## STAMPED STEEL, LOUD-RINGING, POLARIZED BELL.

The accompanying illustration shows a new and unique loud-ringing polarized bell, which has just been developed and placed upon the market by the Holtzer-Cabot Electric Company, Brookline, Mass., and Chicago, Illinois.

A distinctive feature about this bell is that the frame

EXTERIOR VIEW

and case enclosing the mechanism are made from stamped steel thoroughly japanned, which gives a rigidity to the bell and at the same time makes it much lighter in weight



COVER REMOVED, SHOWING MECHANISM

than the old cast-iron or wood-base types. Also the stamped-steel case is practically dust- and moisture-proof, thus enclosing the operating parts in a waterproof chamber which is conducive to long life and highest efficiency.

The new bell is particularly adapted for use on telephone lines as loud-ringing extension bells, and on alternating current power circuits of 80 to 220 volts at frequencies of 16 to 60 cycles. The current consumption of this bell is extremely low as proved by recent tests of some of the largest telephone companies and is a feature much in its favor.

There are provisions in the base for a condenser when required and the coils may be wound for any desired resistance. The magnet spools are wound with silk-covered wire well insulated, and the magnets and armature are of the highest grade of special iron. The terminal blocks are of solid hard rubber and all connections are so located as to be readily accessible. The gongs are first copper-plated before being heavily nickel-plated, thus insuring longer wear and preventing corrosion. In short, it may be said that this bell has been proved by actual test to be unequaled in point of construction, operation and efficiency, and is strongly recommended wherever alternating current is available.

Descriptive bulletins will be mailed to interested parties, upon request, by the above company.

## CUNARD TURBINE STEAMERS WILL LOWER TRANSATLANTIC SPEED RECORDS.

By J. Golder.

The adoption of Parsons steam turbines for the Cunard liners "Mauretania" and Lusitania," after six years' research, represents as much progress in the building and equipment of ocean "grey-hounds" as that accomplished in the first fifty years of the company's existence; and it is entirely within reason to say that, without turbines, the present high stage of efficiency would never have been reached.

Not that these steamers would have been impossible with reciprocating engines, but that the constructional difficulties involved would have been so very much greater that it is doubtful whether any engineer could be found capable of undertaking them.

The limits of the reciprocating engines appear to have been reached in the "Kaiser Wilhelm II," which holds the record for transatlantic speed, having made the passage between Queenstown and Sandy Hook in just five days, the best day's run being 583 knots. This vessel has 16 cylinders, 12 crank shafts, 19 boilers, 124 furnaces, and consumes 660 tons of coal per 24 hours.

The Cunard turbine steamers above referred to will have four ahead and two astern cylinders, 24 boilers, 190 furnaces, and will burn nearly 1,000 tons of coal per 24 hours; but they will reduce the passage to Sandy Hook from Queenstown to about 4 days 12 hours.

It will be noted that 50 per cent more coal per day will be required for only half a day's reduction in passage. The explanation is that the type of propelling machine has very little to do with the power necessary to drive a given vessel at a given speed. The resistance offered by the water to the progress of the vessel increases in the ratio of the speed cubed and is also greatly affected by the vessel's length; hence, although these big new vessels will show from six to seven per cent increase in speed over the best reciprocating engines, nature demands an expenditure of some sixty to seventy per cent more energy for the privilege.

The heavy increase of power for a small increase of speed has restricted the design of transatlantic fliers beyond a certain point of speed and power, and it was the advent of the turbine alone which gave the engineer a new opportunity for obtaining even a small increase of speed, because he found it possible to crowd the necessary power into the hull of his ship much more easily with turbines than with reciprocating engines.

These turbines, which are the largest ever constructed, have identically the same type of blading as that used in the Parsons land turbines, built by Allis-Chalmers of Milwaukee.

# NEWS NOTES

## TELEPHONE AND TELEGRAPH.

Telephone users at North Yakima, Wash., west of Spokane, have been advised that the Independent Telephone Company will invade the field and establish an up-to-date service, with long distance connections to surrounding cities. J. P. Reed of Seattle, representing the Independent Company, had a conference with the Mayor and several Councilmen a few days ago, and met with such encouragement that he has decided to apply for a franchise at the meeting of the City Council in July.

The forest service has begun work on telephone lines in the Hell Gate national forest and the Montana portion of the Bitter Root forest, east of Spokane. One line from Darby to Alta, thirty-seven miles, and another twenty-five miles, from Darby to an important ranger's station at Rose Kole, will be built. These lines will give ready communication between distant parts of the national forests and the headquarters of the Supervisor at Missoula. These national forest telephone lines are growing in favor among the settlers, affording as they do telephonic facilities not otherwise likely to be supplied.

The Commercial Club of Cheney, Wash., west of Spokane, adopted a resolution to have a committee wait upon the management of the Pacific Telephone and Telegraph Company, in Spokane, and request an improvement in service. The people want an all-night service. The electric light company lowered its poles a month ago, and as the telephone wires are attached to these poles they were pulled out of position and crossed, and the service has been unusually poor since that time. If the service is not improved soon officers of the club say they will consider a proposition to form an independent company and connect with the Home Telephone Company.

Sixty thousand dollars is asked by W. F. Hobbin in a suit instituted in the Spokane Superior Court against the Washington Water Power Company and the Rocky Mountain Bell Telephone Company. The plaintiff alleges that in June, 1905, he was employed as a lineman by the telephone company and was engaged in stringing wires between the towns of Wallace and Burke, in Idaho. At points along this line the high voltage power line of the water power company comes within six or eight feet of the telephone line. While handling a wire which was being strung on the poles of the telephone company, the plaintiff claims, he sustained a severe electric shock, caused by the wire he was handling coming in contact with the high voltage wires of the other company. He was in the hospital two months.

Spokane, Wash.—Competition of the liveliest kind in the telephone business is promised Spokane for the end of this year. Institution of a system by the Home Telephone Company has now progressed far enough that it is believed by officials of the company that conection with the switchboard in the main exchange will be made in December. Work is under way on the erection of the exchange building at Howard Street and Second Avenue, and the contract calls for the completion of the work by November 1st. It will require six weeks or two months to install the switchboard, after which connection can immediately be made. By the terms of its franchise the new company must install equipment to accommodate 10,000 telephones, and expend $600,000 within three years. There are now in use in Spokane, including the suburban lines, more than 11,000 phones. The Home company will have an automatic board. The building will cost $100,000, exclusive of equipment, which will cost considerably more than the building. In addition to this exchange, a sub-exchange will be built on Augusta Avenue, between Post and Wall Streets, to cost $50,000, exclusive of equipment.

## POWER AND LIGHT.

The Oro Water, Light and Power Company intends building a Portland cement plant at Pentz' Ranch, Butte Co. This plant will be operated by power developed from the company's new plant, which has recently been constructed on the west branch of the Feather River.

Oroville.—Work on the concrete lining of the 1207-ft. Big Bend Tunnel, in Butte County, is being pushed as rapidly as possible by the engineers of the Great Western Power Co. The erosive action of the water in the natural bed rock formation cut the inner surface of the tunnel, making holes and irregularities in the sides, and the concrete is being put in to correct the irregularities already cut and prevent any future erosive action.

## ENGINEERING.

Wenatchee, Wash.—The Wenatchee Heights Orchard Company has made application to the government for five storage reservoir sites in Stemlit Basin about 10 miles from Wenatchee. The reservoirs will be filled with flood waters from Stemlit Creek, and are expected to furnish water for 500 acres of land in addition to the company's present irrigation system taken from the same source.

Seattle, Wash.—The Candle Alaska Hydraulic Gold Mining Company, of which Tom Noyes and Fred Myers are the principal owners, is now building a big ditch about forty-two miles long to carry water from the Keewalic River to its properties on Candle Creek. W. G. Leland has charge of construction, and now has 350 men at work so as to rush the canal to completion. The work will cost about $350,000. Six miles of big pipe is now being made in Seattle to be used for siphons along the line of the ditch.

## POWER AND LIGHT.

Glendale, Ore.—Jas. H. Moore, of Portland, will install an electric light plant in this city, work now commencing.

The Big Baldy Mining and Milling Company will erect a power plant at Grangeville, Idaho, to develop electric power for use in the mines.

The Beaver River Power Company of Telluride, Colo., has been capitalized at $500,000. I. E. Brown, S. A. Bailey, and Cooper Anderson are the incorporators.

Waitsburg, Wash.—Roberts & Henderson are installing a 50-horsepower gasoline engine at their electric light plant, as the river does not furnish water enough to give them all the power they want.

Portland.—A new incorporation is the Brandon Light & Power Company; capital, $30,000; object, general electric and power business; incorporators, F. P. Dinner, C. E. Hollopeter, Alex Sweek.

Billings, Mont.—The City Council has granted the petition of C. A. Williams for a heating plant and July 18 is the date set for the special election. Mr. Williams represents a Chicago syndicate which desires to install a public heating plant in this city.

Medford, Ore.—The Condor Water & Power Company, in accordance with the result of the recent city election, has paid Medford $20,000 for its electric light plant and assumed full charge of it. It will hereafter furnish the people of Medford with electricity direct instead of wholesaling it to the city.

North Yakima, Wash.—The Northwest Light and Water Company has completed arrangements for right-of-way for its power line from the power house to the city. The line runs from the power house along the county road to the intersection of the North Yakima & Valley Railroad and follows the railroad to the city.

Lardeau, B. C.—The Spokane Falls Placer Mining Company, a company controlled by Minnesota and Spokane men, will install a light and power plant at its large placer holdings near the mouth of the Lardeau River, B. C., and will supply the town of Trout Lake with light. The contemplated improvements will cost about $10,000.

Wenatchee, Wash.—Frank S. Chambers, a consulting electrical engineer of Portland; Mr. Corbet, a gas engineer of Seattle, and Mr. James, a construction engineer of Seattle, were here figuring costs of construction of the Wenatchee Electric Company's new plant that will be built here this summer. The plant will cost about $60,000, and the management hopes to have it in operation by the middle of October. The machinery for the new plant has been ordered for some time and will soon be ready for shipment. Plans for the building will be completed this week and the work of constructing will begin at once.

Dawson, Y. T.—The most gigantic water grant ever issued for water in the Yukon has just been issued by the minister of the interior, Frank Oliver, to the Yukon Milling, Dredging & Power Company. The grant is for 50,000 inches of water from the Klondike River for twenty years. The diversion is to be made from the river at a point three-quarters of a mile above Rock Creek. Rock Creek is fifteen miles from the mouth of the Klondike. The company is given the authority to use the same for generating power and to transmit and sell the power. The power is to be developed by turbine or Pelton wheels.

Sumpter, Ore.—The old steam hoist of the Red Boy mine has been shipped to Butte, Mont. Since the inauguration of electric power at this mine, steam is unnecessary. The power line from the plant to the other sections of the district is not yet finished, but it is expected to have the Imperial mine in the Cable Cove district connected some time in July, when that property will also be operated by electric power. Surveys are now being made for the power line into the Greenhorn section, where there are many properties that will utilize this power. It is also intended to survey into the Quartzburg district for the same purpose.

New Westminster, B. C.—Application for a water right has been made to the water commissioner by John Hardie Sprott of New Westminster, for the purpose of supplying power for manufacturing electricity, for lighting and power purposes. The application has been made for nine thousand inches of the waters of the Mamquam River, which runs through the Squamis Valley. Mr. Sprott intends diverting the stream at the mouth of the canyon, and by means of a pipe and ditch head creating a pressure for the purpose of running the turbines for the dynamos and returning the water to the river about half a mile below the falls. There is a difference of about 220 feet from the place where the water is taken to the place where it is to be returned.

Sealed tenders will be received up to September 3 by the chairman of the Board of Control, Winnipeg, Man., for the construction of the general works and for the supply and erection of the various portions of the equipment for the hydro-electric works and station at Point du Bois, for a transmission line between Point du Bois and Winnipeg, and for a receiving transformer station in Winnipeg. The equipment will include five 4000-horsepower turbines, two 450-horsepower turbines, five and two generators each of 3000 and 250 kilowatts capacity respectively, one induction motor, five step-up transformers, five step-down transformers, seven turbine governors and a telephone system, a transmission system seventy-five miles long, steel towers, testing transformers and apparatus, three electric traveling cranes, and much auxiliary apparatus. Plans and specifications may be obtained from the power engineer's office, Carnegie Library Building, Winnipeg, or from C. B. Smith, Confederation Life Building, Toronto, Ont.

## POWER AND LIGHT.

The San Luis Potosi Tramways Company will build an electric railway from San Luis Potosi to the mining camp of Cerro de San Pedro, a distance of fourteen miles. All of the mule-car lines of the company in San Luis Potosi are to be changed to electric traction.

The Monterey Railway, Light and Power Company, which purchased the two street-railway systems in Monterey more than a year ago, is making good progress in the work of rebuilding the several lines and converting them into electric transit. A number of extensions and new lines are also being built. The company will have expended about $2,000,000 in the improvement work when it is finished. The line which runs from Monterey to the suburban pleasure resort of Topo Chico will soon be finished. It will be placed in operation as soon as the power station is completed. The company is composed of a syndicate of Canadians, headed by William Mackenzie of Toronto.

Mexico City.—The Mexican Light and Power Company is constructing another large storage reservoir at Necaxa, where its hydro-electric plant is situated. The construction of the dam has necessitated the removal of about 2,000,000 cubic yards of material. This is being done by hydraulic sluicing. The Los Reyes River has been diverted into the Necaxa basin, giving considerable additional water in case of need. The ultimate capacity of the two reservoirs will be 70,000,000 cubic meters and 26,000,000 cubic meters, respectively. There is also a small reservoir formed by the dam on the Tezcapa River. The company is installing two additional generators at Necaxa, each having a capacity of 8200 horsepower. A portion of the hydraulic works for a second installation of six generating units of 10,000 horsepower each has been constructed. They will be situated at an elevation of 1500 feet above the first power house, where the company will utilize a drop of 2140 feet, thus using the same water twice over. This addition of 60,000 horsepower which is now being installed will make the plant of the Mexican Light and Power Company by far the largest in Mexico. It already has transmission lines running to Mexico City, El Oro and Puebla. It provides all of the lighting and electric power for these three places. The street-railway system in Mexico City is owned by the same interests and power for the operation of the cars is supplied by the Necaxa plant.

## TELEPHONES.

Nez Perce, Idaho.—John McGee, manager of the Nez Perce Telephone Company, states that a nine-mile extension to Vollmer is in prospect, when all towns on the Culdesac-Grangeville extension of the N. P. Railway will be served.

Tacoma.—F. E. DeParcy, C. S. Barlow, Edwin Miller, J. H. McFarland and G. C. Pierce have incorporated a telephone company and will build a line from Tacoma to Gig Harbor, Fox, McNeil's and Anderson Islands. Capital, $20,000.

La Grand, Ore.—The Aurella Mining Company of La Grande has been granted a permit to construct a telephone line five miles long in the Blue Mountain National Forest, Oregon, for communicating with outside points. The line will not do commercial business.

Victoria, B. C.—The B. C. Electric Telephone Company's offices in the Bank of Montreal Building have been remodeled. The business office of the company has been moved to the basement and the entire top floor will be devoted to the operating department.

Adams, Ore.—All of the rural telephone lines centering at this place have connected up with the central office of the Pacific States Company in order to get the benefit of the long-distance service, which was not available under former conditions. The Pacific States Company furnishes the phones, for which a rental of $1 a year is charged.

Hoquiam, Wash.—At a meeting of the City Council the action taken by this body several weeks ago in declaring the telephone franchise granted to E. C. Finch forfeited, was rescinded. The Council declared the franchise forfeited because they thought it was not lived up to, but later found their error and rectified it. This franchise is held by the Home Telephone Company and the work of installing a system will begin during the summer.

## ELECTRIC RAILWAYS.

Napa.—Work on the proposed Napa & Lakeport Electric Railroad will probably be commenced within a few weeks. It has secured right-of-way options from many Napa and Lake County owners of land. During the week Right-of-Way Agent Charles Searle has been engaged in securing a sixty-day extension of time from the land owners, assuring them that active work on the new road would be soon under way. The matter of financing the road, it is learned, has been practically settled. Work on the large stone bridge across the river is being rushed. Richard M. Hotaling of San Francisco is the promoter and has interested Eastern capital.

## INCORPORATIONS.

Oakland, Cal.—Richards Gas and Fume Condenser Company has been incorporated with a capital stock of $1,000,000; subscribed, $25, by G. C. Richards, W. A. Eckmann, G. A. Wagner, Hugh Hamilton, and H. J. Piersol.

H. W. Johns-Manville Co.'s exhibit at the National Electric Light Association convention, at Washington, D. C., was described in our issue of June 15 under the head of the Jamestown Exhibit of H. W. Johns-Manville Co.

## TRANSPORTATION.

Goldfield, Nev.—On advice of District Attorney Swallow, the County Commissioners have rejected all of the bids for the street railroad franchise. Mr. Swallow advised the Board that it could not alter the terms of the franchise to eliminate features relating to freight traffic, but must grant or reject it as advertised.

San Francisco, Cal.—Work on the Presidio and Ferries Railroad is at a standstill, and nothing further will be done until strike conditions change for the better. The line is completed on Jackson Street, but no work has been done on Washington Street. Electric cars are in operation for a few blocks on Union Street.

Tonopah, Nev.—A franchise for an electric street railway has been granted by the County Commissioners of New County to Key Pittman, Arthur Raycraft and L. E. Scoot, upon their bid of $500 for the same. A bond of $2,500 to guarantee the compliance of the grantees with the provisions of the franchise will be put up. Work on the street railroad will be begun within three months, and the road must be completed within two years.

Watsonville, Cal.—J. B. Rogers, chief engineer of the Ocean Shore Railroad, says work on the Ocean Shore is progressing as rapidly as possible. All of the great difficulties have been overcome, and the road is being constructed as rapidly as possible. The Ocean Shore is being built, he says, with the money of the stockholders, and this is regularly forthcoming. It is merely a question of time until the road is completed, not only to Watsonville, but to eastward points. The work could be pushed on some of the sections of the road, particularly the San Joaquin Valley Western with more rapidity if financial conditions in the East were better, but the work will proceed gradually just the same. It is hoped that in the next few months the feeling of necessity to retrench that now exists in the East will pass, and that money will be easier. In this event the San Joaquin Valley Western and the Ocean Shore Eastern roads will be sooner completed.

San Bernardino, Cal.—All doubt that Henry E. Huntington owns the controlling interest in the San Bernardino Valley Traction Company has been removed by a shake up in the directorate to make room for Los Angeles men who will be in close touch with Huntington's other street railroad properties. By the change Howard E. Huntington, son of Henry E. Huntington, was elected director and secretary of the San Bernardino Valley Traction Company, to succeed Jonas S. Wood, of this city, and George S. Patton, of Los Angeles was elected to succeed W. D. B. Brooking, of Redlands. George M. Cooley, vice-president and director in the company, handed in his resignation at a meeting of the partly reconstructed board at Mr. Huntington's offices in Los Angeles last week. It is rumored that the entire personnel of the San Bernardino company is to be changed within a short time, so that the direction of the system will practically be done from Los Angeles. A. C. Denman, Jr., is the present general manager of the company here, and he may be succeeded by Howard E. Huntington.

Marysville, Cal.—No time is being lost by the Northern Electric in building towards Sacramento. Its bridge across the channel of the Yuba is being rushed ahead and will soon be completed. When this is done track-laying will be resumed in good earnest. On the 20th of the present month the first rails will be laid from the Sacramento end of the line, beginning at the subway running under the Southern Pacific tracks on B Street between 18th and 19th, and extending across the American River bridge, now going up with great rapidity across the trestle leading over the 12th Street road, and on to the north as fast as possible. It is thought that the electric line will cut the time between Sacramento and Marysville in half. By present routes it takes from two to three hours to cover the distance, while the cars of the northern, with a maximum speed of 60 miles per hour, are expected to cover easily the direct line of only 41 miles in an hour, as the tract will be practically straight, and as there is at no point more than one per cent grade to overcome.

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## OIL.

Ely, Nev.—It has been known for some time that oil prospects have been found at Cave Creek, midway between Ely and Pioche, but the discovery attracted no particular attention until quite recently when A. J. Fesler and others made a number of locations. Recently, however, James Geary, a well known prospector, who is backed by Charles Olson, has filed on a number of locations.

Reno, Nev.—J. W. Frank, an oil expert of California, claims to have discovered an oil stratum about three miles from Reno City, and has organized a company of Nevada and California capitalists, who have purchased 1,640 acres of land where the discovery has been made, and are now arranging to begin drilling for oil. Mr. Frank claims that he has found a 600-foot channel base of asphaltum, and that he is sure oil will be encountered and, after showing the indications to the men associated with him, has been authorized by them to begin drilling for oil just as soon as he can secure machinery. Following are the stockholders of the company: J. B. Henshaw, president of the Oakland Bank of Savings; J. Lapp, F. Dorman, and Winton McLeod, of Los Angeles; Dr. G. W. Tibbitts, of Reno, and J. W. Frank, and L. D. Raynor, a capitalist of Los Angeles.

Fresno, Cal.—W. H. McKenzie and S. N. Griffith recently signed a contract with the Standard Oil Company to sell to that concern 500,000 barrels of oil at 30 cents a barrel. This is one of the largest deals that has been made in the circles. The amount of money involved is $150,000. The oil is to be delivered in three years, and the $150,000 is to be paid in three installments of $50,000 each year for three years. The oil will be obtained from the Messrs. Griffith and McKenzie's oil wells in the Midway district in Kern County, and the delivery to the Standard will commence in July. For six years Griffith and McKenzie have had these wells shut up because of the poor prices that were being paid for oil. At the time the wells were closed there was one good flowing well, and others were in construction, but the low price paid for oil caused the owners to have their wells capped and work suspended. Work on these wells will commence immediately, as it is the intention of the owners to bore one well a month. It is estimated that the output of each well will be between 250 and 300 barrels daily.

## FINANCIAL.

Redding, Cal.—The Sacramento Valley and Eastern Railway has called a special meeting of stockholders for August 12th, to consider and vote upon the proposition to increase the capital stock from $300,000 to $500,000.

San Francisco, Cal.—Judge Seawell has denied the application of Horace G. Platt and Edgar J. De Pue, representing the Geary Street Railway, for an injunction restraining the Board of Supervisors from levying a tax in excess of the dollar limit, and from carrying out the provisions of the ordinance passed for the purpose of acquiring the Geary Street road.

Salinas, Cal.—The Monterey, Fresno and Eastern Railroad Company has filed a mortgage with the County Clerk on all its property to secure payment of bonds for $5,000,000. The Mercantile Trust Company, of San Francisco, will act as trustee. The property mortgaged includes wharf and street railway franchises in Monterey.

Goldfield, Nev.—A bond indenture was made recently by the Goldfield Gas and Coke Company through the Nevada Registration and Trust Company as trustee, announcing that the Board of Directors had been authorized to issue bonds for the amount of $400,000, to build a new gas plant, offering the franchise privileges as security. Work on installation of plant and mains, which will be located north of the Nevada Goldfield Reduction Works, will be commenced as soon as a working capital is secured.

San Francisco, Cal.—A reduction of approximately $10,000,000, the price for which the Spring Valley Water Company will sell to the city such of its properties as will be needed for a municipal water suppiy, was effected at the conference which was held yesterday afternoon at the offices of the company. The tentative price at which the company has expressed a willingness to sell to the city its plant is a little less than $34,000,000. In this offer it was stipulated that the company should retain ownership of the Lake Merced lands, the city to have possession until such time as its contemplated system from the Sierra was completed. It is understood that the company makes this reservation with the purpose of disposing of these lands in residence lots, and their value for this purpose has been estimated at $16,000,000.

San Francisco, Cal.—The Associated Savings Bank, of San Francisco, which organization includes every institution of this kind in the city, has filed a copy of a set of resolutions with the Board of Supervisors protesting against the passage of that portion of the budget which provides $720,000 for the construction of a municipal street railway on Geary Street. The communication sets forth that the Association represents 150,000 depositors who pay about $200,000 of the increased taxation imposed by the item referred to, and that it is the first business of the Association to protect the interest of the depositors. The reasons given are that the item would place the taxes beyond the limit provided for in the character that there is no urgent need of municipal railway, while there are other things which the city needs greater. Some of the necessities of San Francisco are set forth in the communication as follows: Fire boats, repair old fire cisterns and construction of new ones, an auxiliary water supply, paving the streets, engine houses in new parts of the city, the construction of school houses, the repair of public buildings, and the construction of sewers. It is said that the improvement in the fire protection would save the city $1,000,000 a year in premiums.

## TRANSMISSION.

Loyalton.—Henry Goering is now in Beckwith section looking into the matter of erecting an electric plant through which to supply this valley with light and power. The company through which Goering is working holds valuable water rights which insures them at least 1,000 inches of water the year around.

Red Bluff, Cal.—H. H. Hammer and J. J. Hammer have filed notice of their intention to take 10,000 inches of water from the south fork of Cottonwood Creek, at a point 300 yards above the mouth of Maple Creek. This water will be used for mechanical purposes and to generate electricity. The point of diversion is six miles from the point where the water will be used.

Fallon.—A contract has been closed with the United States Government by J. B. Daniel, general manager of the Nevada Wonder mine, and representative of the Brock syndicate of Philadelphia capitalists, for the right to operate the water power at the end of the Truckee-Carson irrigation canal, 12 miles from Fallon. The primary object of the company securing this power is to generate the electric power for the $1,000,000 chlorination mill, work on which is to begin at once. The electric current will be generated at this point indicated and transmitted by 75 miles of wire to the towns of Fallon, Fairview and Wonder. Through this plant these towns will be furnished with electric light, and a part of the plant contemplates the immediate construction of an electric railroad from Fallon to Fairview and Wonder, which will insure the opening up of a score or more mines which cannot now be operated because of the prohibitive cost of transportation.

## ILLUMINATION.

Oakland, Cal.—A communication from the Western Gas & Power Company, offering to put at the tunnel at the top of the Kennedy grade a gasoline gas plant for $700, has been referred to the Road and Bridge Committee of the Board of Supervisors.

St. Helena, Cal.—H. M. Pittman has purchased the property of the St. Helena Fruit Drying and Packing Company, at Barro Station, from A. D. Buttler, and proposes to establish an electric lighting plant there with which to furnish St. Helena and Calistoga with electric current.

Porterville, Cal.—Engineer B. S. Peterson, of the Western Gas and Construction Company, who has been looking over the ground for a new gas plant with J. N. Larson, has returned to San Francisco. He has all data and figures for the new plant and will soon submit an estimate on the plant's daily capacity. Work will be commenced within the next 30 days.

## WATERWORKS.

Sacramento, Cal.—At the meeting of the Board of Trustees recently the Surveyor brought in specifications for 83 pieces of ten-inch pipe for the extension of the water system from the new pump to the river.

San Francisco, Cal.—The plans of Chief Shaughnessy, of the fire department, for the establishment of 36 additional cisterns throughout the Mission were indorsed in resolutions passed by the Mission Promotion Association at its meeting last week. F. E. Edwards announced that the capacity of private water supplies in the district now exceeds 1,000,000 gallons.

### TELEPHONE AND TELEGRAPH.

San Leandro, Cal.—The Pacific States Telephone and Telegraph Company has consented to install an all night telephone service here. The service will be installed as soon as the necessary equipment can be put in place.

Sacramento, Cal.—The construction of a telephone line from Tuolumne Camp to Merced Ranger Station, 25 miles in length, has been authorized on the Stanislaus National Forest of California, and work will be commenced at once.

Los Angeles, Cal.—The United States Wireless Printing Telegraph Company has secured an option on a large industrial site with 88 feet frontage on East Ninth Street, and 130 feet on Mateo Street. As soon as the directors of the company meet in San Francisco and pass upon the purchase, which undoubtedly will be accepted, a large modern and equipped plant will be erected for the purpose of manufacturing telautoprint instruments.

### INCORPORATIONS.

Los Angeles, Cal.—Musick Consolidated Oil Company, of San Luis Obispo County, has been incorporated with a capital stock of $500,000. The directors are Mrs. Delia Rawson, M. E. C. Munday, Miss Mamie Sexton and others.

Visalia, Cal.—San Joaquin Light and Power Company has been incorporated with a capital stock of $300,000; shares, $100 each; subscribed, $5,000, by W. G. Kerckhoff, A. C. Blach, K. Cohn, Abe Haas, and H. W. O'Melvery, all of Los Angeles, the place of business.

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